

(NASA-News-Release-94-47) NASA  
DEVELOPS NEW DIGITAL FLIGHT CONTROL  
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## **NASA Develops New Digital Flight Control System**

Landing a jet on a small ship in choppy seas at night is a tough job, even for experienced pilots. NASA has developed and is now testing a new integrated flight and propulsion control system to help pilots land under these and other adverse conditions.

Aerospace engineers at NASA's Ames Research Center, Moffett Field, CA are developing the digital fly-by-wire flight control system to reduce a pilot's workload and help stabilize landing aircraft. NASA is testing the new flight control system in the V/STOL (Vertical/Short Takeoff and Landing) Systems Research Aircraft (VSRA) to improve takeoff and landing capabilities for V/STOL aircraft in reduced visibility. The VSRA is a modified version of the U.S. Marine Corps' AV-8B Harrier jet fighter, which can take off and land vertically.

"Digital fly-by-wire can give the pilot direct control over the aircraft's velocity," said Ed Aiken, an Ames aerospace engineer. "It helps the pilot control the aircraft at low speed," he said. "At low speed in a V/STOL aircraft such as the AV-8 Harrier, you lose the stabilizing effects of the aircraft's aerodynamics and only the aircraft's propulsion system holds you aloft."

The new automated flight control system features both heads-up and panel-mounted computer displays to help the pilot control the aircraft. "Pilots can land with very low visibility, at night or in a hazardous landing zone," said program manager John Foster. "They can slow the aircraft to hover and land vertically on a small site."

The flight control system also automatically integrates control of the aircraft's thrust and thrust vector angle. "We can change the aircraft's thrust angle automatically to improve control during hovering, Foster said. "This allows the pilot to concentrate on other tasks such as avoiding obstacles or communicating with the ship if landing at sea."

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Flight tests, which include simulated shipboard landings using the Global Positioning System (GPS) for guidance will continue at Ames through Dec. 31. Project participants include pilots and engineers from the Marine Corps, McDonnell-Douglas, Lockheed, Boeing, Northrop/Grumman and NASA.

"This research provides some valid design guidelines for these aerospace companies to apply to a new STOVL (Short Takeoff and Vertical Landing) fighter," Aiken said.

"They can study our test results and modify the flight control system for their particular aircraft," Foster said. "They want a control system they can build with minimal risk and investment. We think ours will work. It really does reduce the pilot's workload."

The VSRA research project is supported by NASA, the U.S. Marine Corps, the U.S. Naval Air Systems Command. Flight research data will be used to develop and validate integrated control technology for future Advanced Short Takeoff and Vertical Landing (ASTOVL) aircraft.

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